

What Is Claimed Is:

- 1 1. A data storage system for storing data for a host processor, the
2 data storage system comprising:
3 a plurality of physical data storage devices each having data storage
4 attributes; and
5 an outboard storage manager operable with the plurality of physical
6 data storage devices for presenting to the host processor a virtual data storage
7 image having a desired data storage attribute for a particular data storage
8 application by organizing the physical data storage devices in an arrangement
9 suitable for providing the desired data storage attribute irrespective of the data
10 storage attributes of the physical data storage devices such that the organized
11 physical data storage device arrangement emulates the virtual data storage image,
12 wherein the outboard storage manager is operable to transfer data between the host
13 processor and the organized physical data storage device arrangement via the
14 virtual data storage image.
- 1 2. The data storage system of claim 1 wherein:
2 the virtual data storage image is a virtual data storage device image.
- 1 3. The data storage system of claim 1 wherein:
2 the virtual data storage image is a virtual data storage file image.
- 1 4. The data storage system of claim 1 wherein:
2 the virtual data storage image is a virtual data storage database
3 image.

1 5. The data storage system of claim 1 wherein:
2 the virtual data storage image presented by the outboard storage
3 manager is a virtual disk component.

1 6. The data storage system of claim 1 wherein:
2 the virtual data storage image presented by the outboard storage
3 manger is a virtual tape component.

1 7. The data storage system of claim 1 wherein:
2 the virtual data storage image presented by the outboard storage
3 manager is a virtual library component.

1 8. The data storage system of claim 1 wherein:
2 the virtual data storage image presented by the outboard storage
3 manager is a virtual server component.

1 9. The data storage system of claim 1 wherein:
2 the virtual data storage image presented by the outboard storage
3 manager is a virtual database component.

1 10. The data storage system of claim 1 wherein:
2 the virtual data storage image presented by the outboard storage
3 manager is a virtual object component.

1 11. The data storage system of claim 1 wherein:

2 the outboard storage manager organizes the physical data storage
3 devices in the arrangement suitable for providing the desired data storage attribute
4 as a function of attributes of the data for the particular data application.

1 12. The data storage system of claim 1 further comprising:
2 a storage manager client resident on the host processor, wherein the
3 storage manager client is operable with the outboard storage manager for
4 transferring information indicative of the desired data storage attribute for the
5 particular data application to the outboard storage manager.

1 13. The data storage system of claim 12 further comprising:
2 a storage manager client resident on the host processor, wherein the
3 storage manager client is operable with the outboard storage manager for
4 transferring information indicative of the attributes of the data for the particular
5 data application to the outboard storage manager.

1 14. The data storage system of claim 1 wherein:
2 the outboard storage manager further includes interim storage for
3 storing data transferred between the host processor and the combined physical data
4 storage device arrangement via the virtual data storage device.

1 15. The data storage system of claim 1 wherein:
2 the outboard storage manager includes a front end and a back end,
3 the front end operable for presenting to the host processor the virtual data storage
4 image having the desired data storage attribute for the particular data application,
5 the back end operable for organizing the physical storage devices in the suitable
6 arrangement, wherein the front end is connected by a data channel function and a

7 control path function to the host processor for receiving the data and information
8 indicative of the desired data storage attribute, wherein the back end is connected
9 to each of the plurality of physical data storage devices by respective data channels
10 for transferring the received data to the organized physical data storage device
11 arrangement providing the desired data storage attribute.

1 16. The data storage system of claim 15 wherein:
2 the data channel function and the control path function connect to
3 the front end by using a single communication line.

1 17. The data storage system of claim 15 wherein:
2 the data channel function and the control path function connect to
3 the front end using respective communication lines.

1 18. The data storage system of claim 1 wherein:
2 the plurality of physical data storage devices includes a disk
3 subsystem.

1 19. The data storage system of claim 1 wherein:
2 the plurality of physical data storage devices includes a tape
3 subsystem.

1 20. The data storage system of claim 1 wherein:
2 the plurality of physical data storage devices includes an optical
3 subsystem.

1 21. The data storage system of claim 1 wherein:

2 the plurality of physical data storage devices includes a solid state
3 subsystem.

1 22. The data storage system of claim 1 wherein:
2 the plurality of physical data storage devices includes a probe
3 storage subsystem.

1 23. The data storage system of claim 1 wherein:
2 the outboard storage manager arranges the combined physical data
3 storage device arrangement emulating the virtual data storage image in a storage
4 hierarchy having several storage levels without knowledge by the host processor
5 for the particular data application.

1 24. The data storage system of claim 23 wherein:
2 the outboard storage manager promotes and demotes storage levels
3 in the storage hierarchy without knowledge by the host processor for the particular
4 data application.

1 25. The data storage system of claim 23 wherein:
2 the outboard storage manager removes and restores storage levels
3 in the storage hierarchy without knowledge by the host processor for the particular
4 data application.

1 26. The data storage system of claim 23 wherein:
2 the outboard storage manager transfers the data from the host
3 processor directly to intermediate storage levels via the virtual data storage image
4 without knowledge by the host processor for the particular data application.

1 27. The data storage system of claim 23 wherein:
2 the outboard storage manager transfers respective portions of the
3 data from the host processor to respective storage levels via the virtual data storage
4 image without knowledge by the host processor for the particular data application.

1 28. The data storage system of claim 23 wherein:
2 the outboard storage manager transfers data simultaneously to
3 different storage levels via the virtual data storage image without knowledge by the
4 host processor for the particular data application.

1 29. The data storage system of claim 23 wherein:
2 the outboard storage manager transfers data simultaneously from
3 different storage levels to the virtual data storage image without knowledge by the
4 host processor for the particular data application.

1 30. The data storage system of claim 23 wherein:
2 the outboard storage manager arranges a physical data storage
3 device in the combined physical data storage device arrangement in a storage
4 hierarchy having several storage levels without knowledge by the host processor
5 for the particular data application.

1 31. The data storage system of claim 23 wherein:
2 the outboard storage manager arranges a portion of a physical data
3 storage device in the combined physical data storage device arrangement in a
4 storage hierarchy having several storage levels without knowledge by the host
5 processor for the particular data application.

1 32. A data storage system for storing data for a host processor, the
2 data storage system comprising:
3 a plurality of physical data storage devices each having data storage
4 attributes; and
5 an outboard storage manager operable with the plurality of physical
6 data storage devices for presenting to the host processor a virtual data storage
7 image having a desired data storage attribute for a particular data storage
8 application by organizing the physical data storage devices in an arrangement
9 suitable for providing the desired data storage attribute irrespective of the data
10 storage attributes of the physical data storage devices such that the organized
11 physical data storage device arrangement emulates the virtual data storage image.

1 33. A data storage method for storing data for a host processor,
2 the data storage method comprising:
3 providing a plurality of physical data storage devices each having
4 data storage attributes; and
5 presenting to the host processor a virtual data storage image having
6 a desired data storage attribute for a particular data storage application by
7 organizing the physical data storage devices in an arrangement suitable for
8 providing the desired data storage attribute irrespective of the data storage
9 attributes of the physical data storage devices such that the organized physical data
10 storage device arrangement emulates the virtual data storage image; and
11 transferring data between the host processor and the organized
12 physical data storage device arrangement via the virtual data storage image.

1 34. The data storage method of claim 33 wherein:

2 organizing the physical data storage devices includes organizing the
3 physical data storage devices as a function of attributes of the data for the
4 particular data application.

1 35. The data storage method of claim 33 wherein:
2 organizing the physical data storage devices includes organizing the
3 physical data storage devices without knowledge by the host processor for the
4 particular data application.

1 36. The data storage method of claim 33 wherein:
2 organizing the physical storage devices includes promoting and
3 demoting storage levels in the storage hierarchy without knowledge by the host
4 processor for the particular data application.

1 37. The data storage method of claim 33 wherein:
2 organizing the physical storage devices includes removing and
3 restoring storage levels in the storage hierarchy without knowledge by the host
4 processor for the particular data application.

1 38. The data storage method of claim 33 wherein:
2 transferring data includes transferring the data from the host
3 processor directly to intermediate storage levels via the virtual data storage image
4 without knowledge by the host processor for the particular data application.

1 39. The data storage method of claim 33 wherein:

2 transferring data includes transferring respective portions of the data
3 from the host processor to respective storage levels via the virtual data storage
4 image without knowledge by the host processor for the particular data application.

1 40. The data storage method of claim 33 wherein:
2 transferring data includes transferring the data simultaneously to
3 different storage levels via the virtual data storage image without knowledge by the
4 host processor for the particular data application.

1 41. The data storage method of claim 33 wherein:
2 transferring data includes transferring the data simultaneously from
3 different storage levels to the virtual data storage image without knowledge by the
4 host processor for the particular data application.

1 42. The data storage method of claim 33 wherein:
2 organizing the physical data storage devices includes arranging a
3 physical data storage device in the combined physical data storage device
4 arrangement in a storage hierarchy having several storage levels without
5 knowledge by the host processor for the particular data application.

1 43. The data storage method of claim 33 wherein:
2 organizing the physical data storage devices includes arranging a
3 portion of a physical data storage device in the combined physical data storage
4 device arrangement in a storage hierarchy having several storage levels without
5 knowledge by the host processor for the particular data application.